

CRITICAL PATH ROADMAP DISCIPLINE(S)	PRIMARY SPECIES / TYPE	SPACE FLIGHT EXPERIMENT TITLE	NASA OBPR - TASK BOOK							
			Year Experiment Was Listed in Book							
			1995	1996	1997	1998	1999	2000	2001	2002
Muscle Alterations & Atrophy	Animal	Adaptive Response of Slow and Fast Skeletal Muscle in the Monkey to Spaceflight	1995	1996						
Muscle Alterations & Atrophy; Bone Loss	Animal	An Evaluation of Collagen Metabolism in Non-Human Primates associated with the BION Space Program-Markers of Urinary Collagen Turnover and Muscle Tissue Collagen Types			1997	1998	1999			
Muscle Alterations & Atrophy; Bone Loss	Animal	Bone and Lean Body Mass Changes Following Space Flight	1995	1996	1997	1998	1999			
Muscle Alterations & Atrophy	Animal	Development of Sensory Receptors in Skeletal Muscle	1995	1996	1997	1998				
Muscle Alterations & Atrophy; Bone Loss	Animal	Effect of Gravity on the Attachment of Tendon to Bone	1995	1996	1997	1998				
Muscle Alterations & Atrophy	Animal	Effect of Microgravity on Rat Masseter Muscle	1995							
Muscle Alterations & Atrophy	Animal	Effect of Weightlessness on Single Muscle Fiber Function in Rhesus Monkeys	1995	1996	1997	1998				
Muscle Alterations & Atrophy	Animal	Effects of Microgravity on Neuromuscular Development	1995	1996	1997	1998	1999	2000		
Muscle Alterations & Atrophy; Neurovestibular Adaptation	Animal	Effects of Microgravity on Postnatal Motor Development	1995	1996	1997	1998	1999	2000		
Muscle Alterations & Atrophy	Animal	Effects of Space Flight on Muscles and Nerves	1995	1996	1997	1998				
Muscle Alterations & Atrophy	Animal	Effects of Space Flight on Neuromuscular Development		1996						
Muscle Alterations & Atrophy; Cardiovascular Alterations	Animal	Expression of Contractile Proteins in Microgravity	1995	1996	1997	1998	1999			
Muscle Alterations & Atrophy	Animal	Flight Verification Test of Nursing Facility (Dr. Riley)	1995	1996	1997	1998				
Muscle Alterations & Atrophy	Animal	Flight Verification Test of Nursing Facility (Kerry D. Walton, Ph.D.)		1996	1997	1998				
Muscle Alterations & Atrophy	Animal	Functional Neuromuscular Adaptation to Spaceflight	1995	1996	1997	1998	1999			
Muscle Alterations & Atrophy; Cardiovascular Alterations	Animal	Mitochondrial Changes in Muscle Following Space Flight (Martin)	1995							
Muscle Alterations & Atrophy	Animal	Morphological, Histochemical, Immunocytochemical, and Biochemical Investigations of Spaceflight-Related Nerve and Muscle Breakdown	1995	1996						
Muscle Alterations & Atrophy	Animal	Neuro-Thyroid Interaction on Skeletal Isomyosin Expression in 0 g	1995	1996	1997	1998	1999	2000		
Muscle Alterations & Atrophy; Bone Loss	Animal	Skeletal Development in Long Duration Spaceflight	1995	1996	1997	1998				
Muscle Alterations & Atrophy; Bone Loss	Animal	The Effect of Spaceflight on Cartilage Cell Cycling and Differentiation			1997	1998	1999			
Muscle Alterations & Atrophy	Cells	Effect of Space Travel on Skeletal Myofibers (9304010)	1995	1996	1997	1998				
Muscle Alterations & Atrophy	Cells	Effect of Space Travel on Skeletal Myofibers (9604496)				1998	1999	2000	2001	2002
Muscle Alterations & Atrophy	Cells	Molecular and Cellular Analysis of Space Flown Myoblasts	1995	1996						
Muscle Alterations & Atrophy	Human	Anticipatory Postural Activity During Long-Duration Space Flight	1995	1996	1997	1998	1999			
Muscle Alterations & Atrophy; Bone Loss	Human	Bed Rest Study (ground based for LMS)	1995	1996						
Muscle Alterations & Atrophy; Bone Loss	Human	Bone Mineral Loss and Recovery After Shuttle/MIR Flights	1995	1996	1997	1998	1999			
Muscle Alterations & Atrophy	Human	Effect of Prolonged Spaceflight on Human Skeletal Muscle				1998	1999	2000	2001	2002
Muscle Alterations & Atrophy	Human	Effect of Spaceflight on Human Skeletal Muscle Force Per Cross-Sectional Area: Architectural, Contractile and Neural Determinants					1999			
Muscle Alterations & Atrophy	Human	Effect of Weightlessness on Human Single Muscle Fiber Function	1995	1996	1997	1998	N/A	N/A	2001	
Muscle Alterations & Atrophy; Clinical Capabilities	Human	Evaluation of Skeletal Muscle Performance and Characteristics (NASA-Mir Phase1B)	1995	1996	1997					
Muscle Alterations & Atrophy; Clinical Capabilities	Human	Evaluation of Skeletal Muscle Performance and Characteristics (SLM-1A)	1995	1996						
Muscle Alterations & Atrophy; Bone Loss; Clinical Capabilities	Human	Foot Reaction Forces During Space Flight				1998	1999	2000	2001	2002
Muscle Alterations & Atrophy; Bone Loss	Human	Magnetic Resonance Imaging after Exposure to Microgravity (284054); Magnetic Resonance Imaging After Exposure to Microgravity (9401586)	1995	1996	1997	1998				
Muscle Alterations & Atrophy; Clinical Capabilities; Food & Nutrition	Human	Measurement of Energy Expenditures during Spaceflight Using the Doubly Labeled Water Method	1995	1996	1997	1998				
Muscle Alterations & Atrophy	Human	Micro-Gravity Induced Changes in the Control of Muscles						2000	2001	2002
Muscle Alterations & Atrophy	Human	Morphological, Histochemical, and Ultrastructural Characteristics of Skeletal Muscle	1995	1996						
Muscle Alterations & Atrophy; Clinical Capabilities; Food & Nutrition	Human	Protein and Energy Status During Long-Term Space Flight					1999	2000		
Muscle Alterations & Atrophy; Clinical Capabilities; Food & Nutrition	Human	Protein Metabolism During Long Term Space Flights	1995	1996	1997	1998	1999			
Muscle Alterations & Atrophy; Clinical Capabilities; Food & Nutrition	Human	Protein Turnover During Space Flight			1997	1998	1999	2000	2001	2002
Muscle Alterations & Atrophy	Human	Pyruvate Supplementation on Muscle Metabolism								
Muscle Alterations & Atrophy; Neurovestibular Adaptation	Human	Relationship of Long-Term Electromyographic (EMG) Activity and Hormonal Function to Muscle Atrophy and Performance	1995	1996	1997	1998				
Muscle Alterations & Atrophy; Bone Loss; Clinical Capabilities	Human	A Low Intensity Mechanical Countermeasure to Prohibit Osteoporosis in Astronauts During Long-Term Spaceflight								2002